Session 21 n°17

Integration of foreign breeding values for stallions into the Belgian genetic evaluation for jumping horses

J. Vandenplas[1], S. Janssens[2] & N. Gengler[1,3]

[1]Animal Science Unit, Gembloux Agro Bio-Tech, University of Liège, B-5030 Gembloux, Belgium
[2]Livestock Genetics, Department Biosystems, KULeuven, B-3001 Heverlee, Belgium
[3]National Fund for Scientific Research, B-1000 Brussels, Belgium
jvandenplas@ulg.ac.be

CONTEXT AND OBJECTIVE

Belgian breeders import stallions from the neighbouring countries **but** no or little Belgian phenotypic information is available to estimate an accurate national breeding value.

➔**Objective**: Integrate foreign estimated breeding values (EBV) associated to their reliabilities (REL) for stallions into the Belgian genetic evaluation of jumping horses

MATERIAL

- 98 French and 67 Dutch Warmblood stallions born after 1978 and associated to a foreign EBV and its REL
- 101,382 horses in pedigree and 712,212 Belgian performances until 2009

METHODS

❖Preparation of foreign information

➢ Conversion of foreign EBV
- ✓ Weigthed Least Squares method
- ✓ Goddard's method (Goddard, 1985)
- ✓ Wilmink's method (Wilmink et al., 1986)

➢ Estimation of REL associated to converted EBV
- ✓ Goddard's method (Goddard, 1985)
- ✓ Interbull formula (IB; Powell et al., 1994)
- ✓ Simplified Interbull formula (IBs)

❖Model

$$\mathbf{y} = (\mathbf{C} \otimes \mathbf{I}_2)\mathbf{c} + (\mathbf{S} \otimes \mathbf{I}_2)\mathbf{s} + (\mathbf{Ag} \otimes \mathbf{I}_2)\mathbf{ag} + (\mathbf{Z} \otimes \mathbf{I}_2)\mathbf{u} + (\mathbf{Z} \otimes \mathbf{I}_2)\mathbf{p} + \mathbf{e}$$

where **c**, **s** and **ag** are the vectors of the fixed effects for competition, sex and age, respectively; **C**, **S**, and **Ag** are the incidence matrices relating records to fixed effects; **X** and **Z** are incidence matrices relating records for each trait to fixed environmental effects and to random genetic effects, respectively; $\mathbf{I}_2$ is an identity matrix linking the 2 traits to the observations.

❖Integration of foreign information and estimation of breeding values using a Bayesian procedure derived from Legarra et al. (2007)

RESULTS

❖The integration of foreign information led to for foreign stallions:

➢Effects on EBV
- ✓Belgian rankings more similar to the foreign rankings
- ✓French stallions: decrease of EBV of 3 to 7%
- ✓Dutch stallions: increase of EBV of 2.5 to 9%

➢Improvement of stability for all the foreign stallions (most improvement when using Goddard's conversion equation)

➢Improvement of REL of at least:
- ✓French stallions: 5%
- ✓Dutch stallions: 2%

➢Contribution of foreign information equivalent to at least 4 years of data

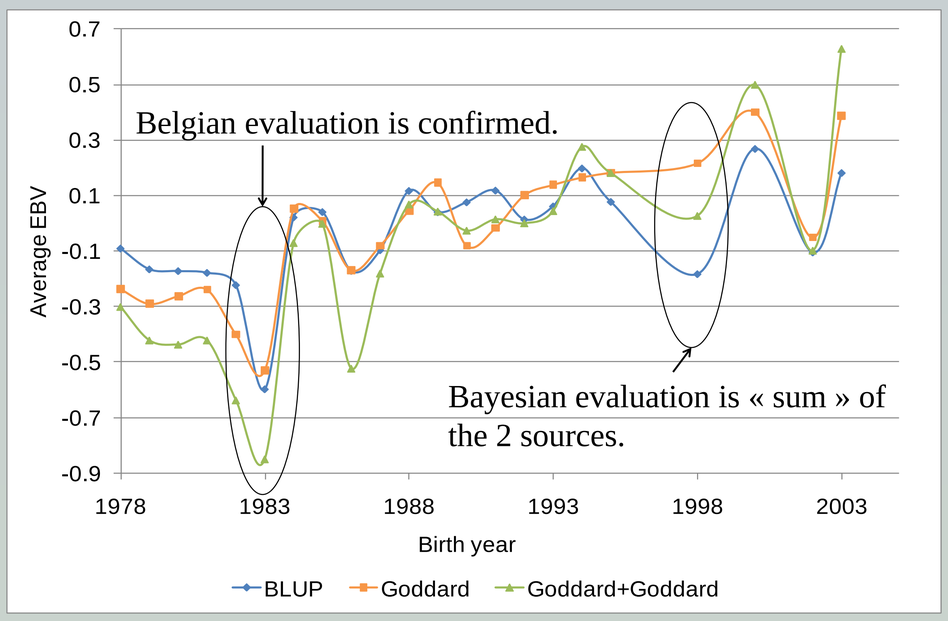

Figure 1. Genetic trends of 2009 traditional EBV (BLUP), 2009 converted EBV (Goddard) using Goddard's conversion equations and expressed on the genetic base of 2009 and 2009 Bayesian EBV using Goddard's methods according to the birth year of the French stallions.

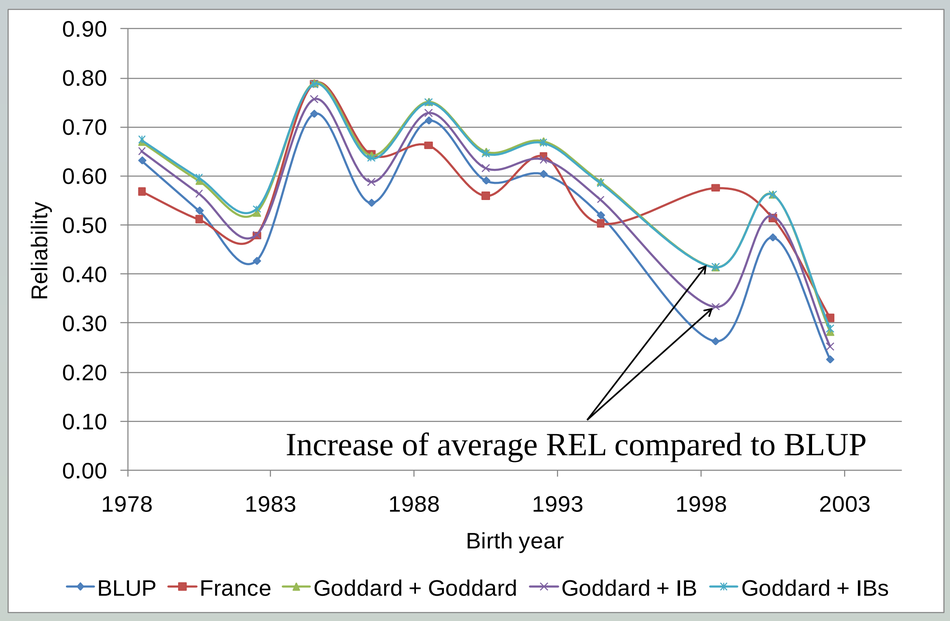

Figure 2. Reliabilities (REL) associated to the breeding values estimated by the 2009 traditional BLUP (BLUP), to the French estimated breeding values (France) and the 2009 Bayesian genetic evaluations, using the Goddard's conversion equation, according to the birth year of the French stallions.

CONCLUSION

The integration of foreign information leads to a Belgian ranking more similar to the foreign rankings and a more accurate EBV for the foreign stallions. Furthermore, the integration is particularly interesting for young imported stallions as the foreign information is equivalent to at least 4 years of data. However, estimates of genetic correlations between countries are needed for better evaluations.

Acknowledgments

J. Vandenplas (Travel grant) and N. Gengler (Research Associate) acknowledge the National Fund for Scientific Research for the support. The authors acknowledge Anne Ricard and Daniëlle Arts for providing French and Ducth information, respectively.

References

Goddard M., 1985. A method of comparing sires evaluated in different countries. *Livest. Prod. Sci.*, **13**, 321-331.
Legarra A. et al., 2007. Multi-breed genetic evaluation in a Gelbvieh population. *J. Anim. Breed. Genet.*, **124**, 286-295.
Powell R., Wiggans G. R. & Van Raden P. M., 1994. Factors affecting calculation and use of conversion equations for genetic merit of dairy bulls. *J. Dairy Sci.*, **77**, 2679-2686.
Wilmink J. B. M., Meijering A. & Engel B., 1986. Conversion of breeding values for milk from foreign populations. *Livest. Prod. Sci.*, **14**, 223-229.